DOCUMENT RESUME

ED 384 050 CS 214 907

AUTHOR Swan, Karen; Meskill, Carla
TITLE Multimedia and Response-Based Literature Teaching and Learning: A Critical Review of Commercial Applications. Report Series 2.23.
INSTITUTION National Research Center on Literature Teaching and Learning, Albany, NY.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 95
CONTRACT R117G10015
NOTE 28p.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Viewpoints (Opinion/Position Papers, Essays, etc.) (120)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; *Elementary Secondary Education; Evaluation; *Literary Criticism; *Multimedia Materials; *Reader Response; *Reader Text Relationship; Reading Instruction; Student Needs
IDENTIFIERS Multimedia Technology

ABSTRACT

Response-based approaches to teaching and learning literature provide alternatives to objectifying literature. Where traditional approaches champion close readings of texts and "correct" interpretations, response-based theorists regard readers as active meaning-makers whose personal experiences affect their interpretations of literary works. Response pedagogies encourage the exploration of multiple perspectives and the construction of defensible interpretations and make the quality of students' critical and creative thinking the focus of assessment. They place student-generated questions at the center of learning, encouraging a "problem-finding" as well as problem-solving approach to critical thinking. There is reason to believe that response-based approaches might be facilitated by multimedia applications; the computing medium seems to represent cognitive processes in ways that support their internalization as habits of thought. Therefore, 25 graduate students, most of whom were teachers, evaluated 45 multimedia literature programs to determine their suitableness to response-based pedagogy. They rated the programs on a 10-point scale in several different categories, but reviews were essentially narrative. Results showed that while programs are of high technical quality, the pedagogical approaches taken are not response-based. Programs designed for elementary students equated literature education with reading instruction; programs for high school students adopted a traditional text-centered approach. (Contains 33 references.) (TB)

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Report Series 2.23

1995

Preparation of this report was supported under the Educational Research and Development Center Program (Grant number R117G10015) as administered by the Office of Research, Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed here do not neccessarily reflect the position or policies of the sponsoring agency.

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Multimedia and Response-Based Literature Teaching and Learning: A Critical Review of Commercial Applications

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BACKGROUND

There is growing recognition among educators of the need for establishing practical pedagogical approaches that facilitate the development of literary understanding. "Literary understanding" is that form of thinking which is characteristically divergent and inward, focused on "personal meanings, understandings of human situations and the complex web of relationships embedded in them" (Langer, in press, pg. 3). Literary understanding is thus seen as an important form of critical thought distinct from "scientific reasoning," which is characterized as convergent, objective, logical. Indeed, scholars over the years (e.g., Britton, 1970, 1983; Bruner, 1986) have suggested that these two forms of thinking represent some of the multiple ways in which people make sense of and construct meaning about their world, and that, as such, both are necessary to mature thought.

Although a great deal of attention and activity in the educational community has been focused on the development of critical thinking skills, such efforts have been unidirectional. Critical thinking has traditionally been defined by the properties of scientific reasoning, and so most critical thinking curricula have been confined to the development of the same. Deeply embedded in the tradition of the English language arts, for example, is a text-based set of beliefs which holds that there are "common images, evocations, and responses to a literary piece that all good readers experience"—hence, that "certain approved interpretations of particular phrases, lines, or themes . . . need to be learned" (Langer, in press, pg. 6). Such beliefs have led to the development of literature curricula whose instructional goals and assessment procedures emphasize "objective" readings of the text that converge on sanctioned interpretations. In short, literature curricula typically promote scientific, not literary, understanding (Applebee, 1990).

Response-based approaches to teaching and learning literature (Bleich, 1978; Holland, 1975; Iser, 1978; Langer, 1991; Tompkins, 1980) provide alternatives to objectifying literature. Where traditional approaches champion close readings of texts and "correct" interpretations, response-based theorists regard readers as active meaning-makers whose personal experiences affect their interpretations of literary works. Response pedagogies encourage the exploration of multiple perspectives and the construction of defensible interpretations and make the quality of students' critical and creative thinking the focus of

assessment. They place student-generated questions at the center of learning, encouraging a "problem-finding" as well as problem-solving approach to critical thinking. They emphasize the importance of teaching and learning the *processes* of literary understanding, which are viewed as both socially and personally mediated.

Although response-based theories are generally accepted by scholars in English departments and schools of education alike, response-based pedagogies have yet to become common practice. One impediment to the widespread adoption of response-based practice is the traditional structure of the classroom itself. That structure—in particular, its linearity, its hierarchical lines of authority, and its emphasis on scientific reasoning, on individualism, and on canon—is rooted in the evolution of print as the dominant medium of communication (Eisenstein, 1979; McLuhan, 1963; Purves, 1990). It seems possible, then, that the classroom use of media other than printed texts might result in environments more supportive of response-based teaching and learning. One promising potential alternative is multimedia.

Multimedia combine a variety of media—text, graphics, still photographs, animations, sound, and video—in a nonlinear computer-based environment with which users can interact. There are several reasons to believe multimedia might provide a promising alternative to text:

1. Multimedia support independent learning through student control of information and events (Milheim, 1988) and can thus promote student-centered learning. Indeed, teaching and learning in computer-based classrooms has been shown to be more student-centered than teaching and learning in traditional text-based classrooms (Swan & Mitrani, 1991).
2. Multimedia have proved a powerful catalyst for cooperative learning (Johnson & Johnson, 1986; Webb, 1983). As such, it can enhance socially mediated learning processes.
3. Multimedia support constructionist (Papert, 1993) views of learning which hold that learning takes place when students actively and collectively build knowledge structures. Computer-based representations can make this process explicit, thus increasing the likelihood that students will internalize what they learn (Salomon, 1988; Scardamelia & Bereiter, 1991).
4. Multimedia support multiple representations of knowledge and nonlinear domain analyses (Spiro & Jehng, 1990), and can make accessible the extensive amount of information from which multiple meanings and interpretations evolve (Duffy & Knuth, 1992).
5. The visual and aural elements of multimedia support diverse learning styles (Spoehr, 1992). These same elements make multimedia a rich and engaging learning environment, contributing to high levels of motivation and involvement (Chomsky, 1990).

6. Finally, multimedia create an opportunity for teachers to recast their own understanding of the role of text in the teaching and learning of literature, and, accordingly, their own beliefs about—and roles in—teaching and learning.

Indeed, many contemporary scholars believe that multimedia are ideally suited for response-based approaches to the teaching, learning, and assessment of literary understanding (Bolter, 1991; Landow, 1992), but such notions have yet to be systematically explored.

The ongoing "Multimedia and Literature Teaching and Learning Project" at the National Research Center on Literature Teaching and Learning is concerned with exploring the attributes of multimedia that support the development of literary understanding. The project's first stage, detailed in this report, involved reviewing existing commercial multimedia applications for the teaching and learning of literature from a response-based perspective. A major objective of the project was to develop criteria to help teachers and developers think about multimedia from such a perspective. These criteria were used to review commercial multimedia literature applications and their role in response-based teaching and learning. We also wished to isolate specific features and/or multimedia tools that might support response-based pedagogies. Practical outcomes of this stage of the project were the acquisition of a large number of the commercially available multimedia literature applications, the creation of a preview center where teachers can explore such programs, and the development of a database of critical reviews of multimedia literature applications.

The sections that follow describe the criteria developed for evaluating multimedia literature applications from a response-based perspective, as well as the program-acquisition and evaluation process. The findings of the review are then summarized, and the implications of those findings for literature teaching and learning and for multimedia development are discussed.

EVALUATION CRITERIA

Criteria for evaluating multimedia literature programs were developed by a group of exemplary teachers of literature and graduate students of both literature education and instructional technology, together with the project directors and the directors of the Literature Center. Seven evaluative categories were established through a series of focus-group sessions. It was decided that, while responses within each category (except classroom usage, see below) would include ratings on a 10-point scale for comparative purposes, reviews would essentially be narrative in form to encourage the same kind of critical thinking about multimedia applications that we would hope the applications

themselves would encourage about literature. Group members also decided to add a descriptive cover sheet (to include such items as hardware and software requirements, target population, subject areas covered, cost, publisher, etc.) and a program description to make the evaluations, and the database containing them, more useful to practicing teachers. Indeed, the database we developed can be searched and sorted according to the former characteristics. The seven evaluative categories, however, remain the focus of this phase of the research. These fall roughly into three groupings—technical concerns, response-based considerations, and classroom issues.

Technical Concerns

It is entirely possible that a multimedia literature application might be excellent from an instructional technology viewpoint, yet deal with literature in a manner that is not at all response-based. Group members wanted to distinguish between the two. The first three evaluative categories—content clarity, technical quality, and use of technology—consider multimedia in general. They examine the general quality of programs without considering them from a response-based perspective. Evaluators were asked to provide narrative discussions of the application they were reviewing from each perspective and then to rate that program on a scale of 1 to 10 for each category.

Content clarity is concerned with the general accuracy, completeness, and appropriateness of an application for the given population. It is also concerned with whether the structure of a program and its use of multimedia are appropriate to its content.

Technical quality is concerned with a program's user interface; in particular, with its navigational systems, its use of multimedia, and its ease of use. This category also asks whether a given application's use of multimedia is intrinsic (serves to enhance content) or extrinsic (decorative), and whether or not it is aesthetically pleasing overall.

Use of technology is concerned with whether an application makes good use of multimedia technologies or whether its content could be just as well or better presented using more conventional means. It is particularly concerned with the multimedia aspects of particular applications, but also looks for such uniquely computer-based functions as nonlinearity, internal coaching, construction tools, and student management.

Response-Based Considerations

There is some reason to believe that a unique characteristic of the computing medium is its ability to represent cognitive processes in ways that support their internalization as habits of thought (Papert, 1993; Salomon, 1981; Swan & Black, 1993). This category grouping specifically considers how the formal aspects of multimedia literature applications might support or detract from a response-based perspective. It is thus concerned with whether or not existing multimedia programs represent literary works in ways that might support the processes involved in the development of literary

understanding —what counts as knowledge, the role of the text, the role of the student, and the role of the teacher. Evaluators were asked to provide narrative discussions of the application they were reviewing for each category and to provide each with a rating on a scale of 1 to 10.

What counts as knowledge is concerned with whether a program represents knowledge as constructed or static, as evolving or as canonical. In this category, review teams were asked whether a program was capable of incorporating students' responses to a work of literature, whether it included multiple perspectives on that work, whether it promoted linkages between the text and students' experiences, and whether it encouraged an analytic or an exploratory approach to literary understanding.

The role of the text is primarily concerned with the way meaning is represented in relationship to the text. Many multimedia literature applications, for example, have the ability to pop up definitions or interpretations from text. Review teams were concerned that too much focus on this sort of function could lead students to see meaning as residing in the text rather than as constructed. In this category, therefore, evaluators were asked whether multiple meanings or interpretations were given and whether or not a program made some provision for students to develop their own interpretations of the work.

The role of the students is concerned with whether students are empowered or constrained by an application's design. This category considers the degree of student control over a program, whether a program contains tools for student construction, and whether and how a program validates students' responses to the literary work. In this category, evaluators were also asked whether or not a program might support student discourse about the work.

The role of the teacher is concerned with whether a teacher is empowered or constrained by a program. It considers whether and how a program can be modified by a teacher, whether it includes teacher materials and/or internal management tools, and whether or not a program promotes student-teacher discourse and/or interaction.

Classroom Issues

Although the Multimedia and Literature Teaching and Learning Project is primarily concerned with the design of multimedia materials that support a response-based approach to literature education, how such materials are used will ultimately determine their effectiveness. Bad materials can be used well; good materials can be used poorly. Group members felt, therefore, that a category should be included that dealt with classroom usage. However, because such usage is essentially a function of teacher creativity and not inherent in the applications, no ratings were elicited for this category. Evaluators were simply asked to discuss actual or potential classroom usage.

Classroom usage, then, is concerned with how a multimedia application might be used in a classroom to support literary understanding. Evaluators were asked to provide ideas for using each program, and to tell whether a program could be effectively used individually, by small groups, and/or with an entire class. If they had used a program with students, evaluators were asked to comment on its effectiveness.

PROGRAM ACQUISITION AND EVALUATION

Applications for review were identified through a detailed search of listings dedicated to multimedia materials, such as the *Multimedia and Videodisc Compendium* (Pollack, 1994) and *Multimedia '94* (Educational Resources, 1994), as well as vendor catalogs that included educational multimedia. For the purposes of this study, multimedia literature applications were defined as computer-based programs that included at least one nontext medium (other than simple computer graphics) and that dealt with literary works as literature. Thus, laserdiscs containing film treatments of literary works but no or minimal computer interface were not included, nor were programs that were presented as primarily concerned with language arts skills.

It is perhaps revealing to note that, compared with other content areas, relatively few programs were found which satisfied these criteria. This made it quite easy to undertake a comprehensive review. Publishers were contacted and most agreed to send us review copies of their products. Through this process, we identified 54 multimedia literature programs or program series, and acquired and reviewed 45 of them for this study. Because we were able to evaluate such a high percentage of the available applications, we are confident that our analyses are based on a representative sample.

The applications we acquired were evaluated by 25 graduate students of literature education and/or instructional technology. Most were practicing teachers. Each evaluator was given 2 programs to evaluate and asked to spend some time exploring each. They were then to complete a written evaluation while viewing the program. The written evaluations were collected and reviewed for consistency by a group of 4 graduate students, at which time ratings for applications that had been reviewed by two people were made to agree, and some changes were made in ratings that were inconsistent with the general consensus. The narrative responses to the various categories were very helpful in this regard, but in some cases we had to look again at the applications themselves. The evaluations were then again reviewed by the project directors, who made some changes of their own. Finally, the evaluations were collated and summarized by the project directors for the results section which follows.

SUMMARY OF PROGRAM DESCRIPTIONS

The 45 literature applications we reviewed were produced by 23 different publishers. The majority accessed multimedia from a CD-ROM disk (31), although some used a combination of CD-ROM and laserdisc (10). A few (4) used only floppy disks. The majority of programs (24) were offered for dual platforms (Macintosh and IBM-compatible computers), with the remainder evenly split between applications designed exclusively for Macintosh (11) and those designed exclusively for IBM-compatible (10) computers. In general, the cost of these programs ranged from $25.00 to $100.00 for straight CD-ROM or floppy-disk offerings, and from $200.00 to $300.00 for programs that included a laserdisc. Two very extensive programs were considerably more expensive.

The applications we reviewed, then, were generally moderately priced and designed to be used on commonly available computers. These results indicate that publishers are trying to produce multimedia literature applications that can be used in ordinary classrooms. The bad news is that although the computers on which such applications will run are commonly available in offices, they are not yet commonly available in schools. Many of the teachers involved in our study tried to view the programs at their schools, only to return in frustration to our lab. Perhaps more importantly, even when teachers could find a computer in their school that could run multimedia, there was neither projection equipment nor the numbers of computers available that would make it possible to use a multimedia literature application with a whole class of students. The good news is that most computers now being sold are equipped with CD-ROM drives and can thus run the majority of applications we reviewed, so the situation should improve as we are learning to accept and incorporate the use of multimedia into our teaching and learning.

Another good sign was that the programs we reviewed were evenly split between those designed for elementary and those designed for high school populations. Twenty-two of the applications we looked at were designed for elementary school students, 23 were designed for junior and senior high school students, and one (a game) was targeted for both populations. Because we found quite a difference in approach between applications designed for elementary students and those designed for high school students, general descriptions of programs in these two groupings are given separately below. These are followed by discussions of program ratings for both sets of applications on each specific criteria in sections concerned with each of the three general category groupings we developed.

Programs Designed for Elementary Students

Fully 19 of the 22 applications we reviewed that were designed for elementary students could be best described as "talking books." At their most basic, these applications

commonly presented stories as illustrated text in a linear, page-by-page fashion, with the full text read to the students. Almost all of them highlighted the text as it was read in phrases, but allowed users to click on single words to have them pronounced. Many also defined words on request, both in text and speech, and some defined elements of pictures. Almost half of the talking books we looked at included a non-English-language option in which the text was presented and read in a language other than English, usually Spanish. Only one, however, offered a choice of readers other than by language (i.e., male/female, adult/child). Most also included sound effects and/or music, and many included animated illustrations. None of the elementary applications we reviewed included video. Only one of the talking book programs included any background information about the works presented. None included on-line features that encouraged student comments or interpretations of the works, although a few encouraged off-computer interpretive activities by presenting open-ended questions to be answered on paper, pictures that could be printed and colored, and/or extension activities in a teacher's guide.

Student interaction with elementary level talking books was, in most cases, constrained to a kind of enhanced page-turning capability, in which students could click on icons to turn pages; to access definitions, sound, and/or animations; and, in many instances, to access particular stories, chapters, or pages in the program. Nine of the applications included a print function that allowed students to print text or, more commonly, pictures. Six of the talking book programs we looked at also included interactive quizzes that tested students' comprehension with multiple-choice, single-correct-answer questions. Five included "interactive pages" - illustrations which students could explore by clicking on their different elements to find hidden animations. Most of these were extremely well drawn and animated, and often quite whimsical. Three talking books applications encouraged students to manipulate the stories they were reading—two allowed students to cut and paste text and pictures, to add text, and to color pictures; one allowed students to add sound.

All of the talking books, then, were uniformly centered on the reading of highlighted text, indicating that their publishers view the teaching and learning of literature at the elementary level as little more than the teaching and learning of reading. The ubiquitous association of sound and text in these programs tends to focus on decoding and entertainment, rather than thinking and responding. A common focus on content comprehension and the lack of interest in interpretation, literary devices, authors, and/or background information are further indications of a bias toward skills-based reading as opposed to response-based reading. While not surprising in that it mirrors common practice, this pedagogical approach is nonetheless disappointing. One would hope that the introduction of multimedia into literature teaching and learning might provide the opportunity to break with traditional practice. Computers support not only individualized

instruction but individualized responses. The valuing of students' own meaning-making at this level could introduce habits of thought that would provide a solid foundation for the development of literary understanding. A preoccupation with single-correct, low-level interpretations, on the other hand, creates habits of thought which must later be broken in order for students to develop literary understanding.

The other three—i.e., "non-talking book"— elementary applications we looked at were quite various and therefore defy classification. One was an adventure-type game in which players explored an imaginary environment and picked up objects that they were then supposed to return to appropriate nursery-rhyme characters. When an object was returned to the correct character, the nursery rhyme was recited. The other two applications might best be described as "storymakers." Although they included story examples, these programs were primarily devoted to student assembly of a variety of elements to create their own stories. One of these was primarily text-based, a kind of word processor with predefined elements including pictures; the other was more oriented toward sound and animated elements linked with text.

Programs Designed for High School Students

While the elementary multimedia literature applications we looked at made more extensive use of the computer's sound and graphics capabilities than did the high school applications we reviewed, the latter made greater use of its nonlinear linking capabilities and interactive video technologies. They also exhibited a difference and a greater diversity in pedagogical approach. Although some (6) of these applications could best be classified as "books on computer," they were not "talking books." We also found programs whose approaches most resembled those of databases (7), hypertexts (2), hypermedia (6), and problem-solving games (2). Each of these are described below.

The high school multimedia literature applications most similar to the elementary programs were the *books on computer*. Like their elementary-level counterparts, these programs presented the full text of collected or single works on the computer screen, and most also had the capacity to access definitions of selected words. Like talking books, they were essentially linear, with student interaction limited, for the most part, to electronic page-turning. Many also included interactive questions and answers and/or reproducible off-line exercises similar to those found in the elementary applications. On the other hand, although a few of these books on computer included audio readings of selected passages, unlike the bulk of elementary applications, none offered a complete reading and none highlighted the text as it was read. The books on computer were also more likely to at least minimally value student interpretations by providing on-line note-taking capabilities, and were less likely to provide high-quality illustrations and/or animations.

A second category we found among high school applications were *databases*. These programs provided book notes or the complete texts of collected or single works, plus background information on authors and texts, as well as a variety of database functions for searching, collecting, and printing the information they contained. Most of these applications also included note-taking capabilities, and a few included interactive questions and answers and/or off-line exercises. Some also included rudimentary illustrations, but applications included in this category, like the books on computer, were all essentially text-based.

The two high school multimedia literature applications we categorized as *hypertexts*, although they too contained rudimentary graphics and sound, were also essentially text-based. Programs in this category differed from those designated as databases in that they did not include typical database functions, offering instead extensive built-in links between entries. Both of the applications in this category were focused on background information about a single author and his or her works, and, although they included selected passages from such works, they did not provide the complete texts of any. Both provided on-line note-taking capabilities, and one could be extended by students or teachers who wanted to add to the information it contained.

The six applications categorized as *hypermedia* linked the complete texts of particular works to background information and video segments presented via laserdisc. Five of these applications linked computer-based materials to movies on laserdisc; one provided multiple readings by various actors and multiple interpretations by various scholars of the five works it covered. All of the hypermedia applications we reviewed provided extensive on-line background information on authors, historical context, literary devices, and literary analysis; all provided extensive teacher materials, including suggestions for activities to be undertaken before, during, and after reading the particular text; and most included open-ended questions presented on-line but designed to be answered off the computer. Many of the hypermedia applications also included various on-line activities, including a game, an opinion survey, and a chart maker; and two could be extended and/or altered by teachers or students. None included note-taking capabilities.

The final two high school multimedia applications we reviewed were *problem-solving games* ostensibly linked to literary works. In both games, students were asked to explore simulated environments and collect clues to solve a mystery. The mysteries were not related to the works on which the games were based. Both games were highly interactive and contained excellent graphics and sound, including digitized video segments. Both allowed students to copy information into a notebook, but did not allow student-generated entries, and, although they encouraged a kind of critical thinking, that thinking was convergent and focused on single-correct solutions to the mysteries.

In general, then, the high school applications we reviewed were much more concerned with literature—with interpretations, with context, with authors, with literary devices, and with analyses—than were their elementary-level counterparts, and they were more likely to provide for at least note-taking on the part of students. In tone, however, and (more importantly perhaps) in form, these applications focused on single "correct" interpretations and analyses. They shared the text-centered approach to literature teaching and learning similar to that found in most high schools. Again, while one might have hoped that more software authors would have taken greater advantage of some of the potential response-based technical features of multimedia, it is not surprising (considering the conservative nature of the publishing industry) that they did not.

TECHNICAL CONCERNS

Technical concerns consider the general quality of multimedia literature applications without regard for their relationships to response-based pedagogy. Evaluators generally rated the programs we looked at quite high (7.26 overall) on the three criteria in this category—content clarity (7.88), technical quality (7.18), and use of technology (6.69). High school applications were rated slightly higher than elementary applications (7.51 vs. 7.00), but not really appreciably so. The results indicate that commercially available applications are of generally good quality. Evaluators judged the majority of programs to be accurate, age-appropriate, and relevant to existing curricula by virtue of the literary works selected. Specific findings for each criteria are detailed below.

Content Clarity

"Content clarity" is concerned with the general accuracy, completeness, and appropriateness of a program for the given population. Both elementary and high school applications were most highly rated on this criterion (high school, 8.09; elementary, 7.68), indicating that, in general, commercial multimedia literature applications can quite easily be incorporated into literature teaching and learning at both levels. If one considers applications with ratings of 4 or below as exhibiting "poor" content clarity, those with ratings of 5 to 7 as exhibiting "adequate" content clarity, and those with ratings of 8 or higher as exhibiting "good" to "excellent" content clarity, then only 3 programs (1 elementary, 2 high school) were seen as poor in this regard. According to these standards, 17 programs were viewed as having "adequate" content clarity, and the majority of applications reviewed (25 overall; 11 elementary and 14 high school) were seen as "good" to "excellent" with regard to the accuracy, completeness, and appropriateness of their content.

Half of the elementary programs reviewed focused on fairy tales (9) and fables (2), with such programs about equally divided between anthologies and single stories. The

elementary-level game program was similarly based on Mother Goose rhymes. Five elementary applications were somewhat similarly based on existing picture books adapted for the computer, making all of these suitable for individualized reading classrooms or as motivation for individual literary experiences. Indeed, teachers who observed students using such programs universally commented on the interest they generated in the print versions of the texts. The final elementary program, and the only one which included references to literary concerns, was linked to a commercial reading series.

All but 2 of the high school multimedia literature applications we reviewed were based on book-length works among those most frequently taught in high school English classes (Applebee, 1989) or on authors and/or works common to the seven major literature anthologies used in such classes (Applebee, 1991). All of these could thus be incorporated into high school literature classes without any change in existing curricula. The 2 remaining applications were the problem-solving games, which, as previously stated, were not particularly literary in approach.

Technical Quality

"Technical quality" is concerned with the quality of a program's user interface and its ease of use. If one considers applications with ratings of 4 or below as exhibiting "poor" technical quality, those with ratings of 5 to 7 as exhibiting "adequate" technical quality, and those with ratings of 8 or higher as exhibiting "good" to "excellent" technical quality, then only 3 programs (1 elementary, 2 high school) were seen as poor in this regard. Nineteen programs were viewed as having "adequate" technical quality, and 23 applications (11 elementary and 14 high school) were seen as "good" to "excellent" with regard to technical features.

Evaluators, then, found the average multimedia literature program to be of generally high technical quality (7.18), indicating that most were fairly easy to use and lacking in technical problems. Elementary applications were rated slightly higher (7.45) than high school applications (6.91) on this criterion, most probably because of their basic simplicity. Evaluators had difficulty using the more complicated functions of some high school programs, which tended to require more complex and more specific hardware configurations, making them sometimes difficult to install and run. It was generally agreed, however, that such problems will disappear over time as multimedia equipment becomes more standardized and its usage more common. Indeed, evaluators were generally pleased with the multimedia aspects of the programs they reviewed—in particular, with their computer-graphic and video segments.

Use of Technology

"Use of technology" is concerned with whether or not an application makes good use of multimedia and computing technologies. Applying standards as above to this criterion, evaluators ranked slightly fewer programs (18 overall; 8 elementary, 10 high school) as making "good" to "excellent" use of multimedia, and a good deal more programs (8 overall; 5 elementary, 3 high school) as making "poor" use of multimedia, than on the other two technical concerns. Nineteen applications (9 elementary, 10 high school) were seen as making "adequate" use of multimedia technologies according to these standards.

Nevertheless, evaluators generally agreed that the average program they reviewed did make good use of the technologies it incorporated (6.69). High school applications were rated a good deal higher (7.52) on this criterion than elementary applications (5.86), as it was generally felt that in many cases talking books could just as well be on tape as on computer, and that neither could fully replace a live reader. The most highly rated applications in terms of technology usage were the high-school-level hypermedia applications (8.11), most probably because of the high quality of the video they accessed, but also because many had extensive nonlinear linking tools for student or teacher construction. Indeed, the evaluators agreed that unless nonprint media substantially enhanced a text, most teachers and students could easily do without it. Some features evaluators thought did enhance text included interactive pages; search, cut-and-paste, and print functions; nonlinear linking and note-taking capabilities; and construction tools.

RESPONSE-BASED CONSIDERATIONS

Response-based considerations specifically consider how the formal aspects of a program might support or detract from a response-based perspective. Both high school and elementary applications were generally rated a good deal lower on response-based criteria (4.69 overall) than on technical criteria (7.26 overall), and elementary programs were rated significantly lower (4.06) on average than high school programs (5.32) on this criterion, most likely because they were less concerned with literature and literary appreciation than they were with reading as a skill. Such results are, as previously mentioned, quite discouraging. They indicate that these applications, rather than breaking new ground in literature teaching and learning, have generally adopted older and more traditional reading and text-centered pedagogical approaches. McLuhan (1963) suggests that new media generally mimic old forms before exploiting their uniqueness, as in the cases of, for example, the Gutenberg Bible, or early movies. Perhaps it is too early to be overly discouraged. Perhaps, on the other hand, it is a good time to become proactive on such issues. Specific findings concerning each response-based criterion are discussed below.

What Counts as Knowledge

"What counts as knowledge" is concerned with the formal representation of knowledge within a program, with whether a program represents knowledge as constructed or as static, as evolving or as canon. In general, evaluators found that the multimedia applications we reviewed tended toward the latter (overall, 4.65). If one considers applications with ratings of 4 or below as "poor," those with ratings of 5 to 7 as "adequate," and those with ratings of 8 or higher as "good" to "excellent" in response-based knowledge representation, the greatest number of programs (21 overall; 13 elementary, 8 high school) were seen as poor in this regard. Nineteen programs (6 elementary, 13 high school) were viewed as "adequately" representing knowledge in a response-based fashion, and only 5 (3 elementary, 2 high school) were seen as providing "good" to "excellent" representations of knowledge from a response-based perspective.

Elementary-level applications were rated a good deal lower (3.82) than high school applications (5.48) on this criterion, mostly due to their propensity to provide a single reading of the text and to give single-correct-answer comprehension questions. The more highly rated elementary applications provided multiple voices, open-ended questions, access to background information, and/or interactive pages on which students could click on various objects to find hidden animations. Evaluators who observed students using the latter commented that these pages encouraged an exploratory approach to literature and elicited both questions and links to personal experience from their users. Elements in high school programs that evaluators thought represented knowledge in a more reader-based fashion included multiple representations of the same knowledge (either in differing or the same media), search capabilities, provisions for note-taking and/or editing, open-ended questions, access to background information, nonlinearity, and construction tools.

The Role of the Text

"The role of the text" refers to the way a program represents meaning in relationship to a text. A response-based perspective assumes that there will always be multiple defensible interpretations of a text because readers will always bring varied experiences to their readings. The role of the text examines whether and to what extent multimedia literature applications lend support to such perspective. Evaluators felt that the majority of applications they looked at did not do so (4.83). Applying standards as above to this criterion, evaluators ranked the majority of programs (25 overall; 14 elementary, 12 high school) as representing text "poorly" from a response-based perspective. Fifteen programs (5 elementary, 10 high school) were found to be "adequately" representing text, and only 4 (3 elementary, 1 high school) were seen as providing "good" to "excellent" representations of text from such perspective.

Elementary applications were rated lower (4.18) in this category than high school applications (5.48), mostly due to their lack of provision for student responses, but also because of their frequent use of pop-up definitions which evaluators thought created a very concrete impression of meaning residing in text. The two elementary applications most highly rated on this criterion, in contrast, offered multiple representations of meaning, in texts and graphical illustrations for example, and/or alternative definitions of words from which students could choose.

Evaluators rated high school applications higher than their elementary counterparts, mostly on the strength of two features commonly found in them— note-taking capabilities and open-ended questioning. While evaluators thought all note-taking capabilities were at least minimally a positive feature from a response-based perspective, they preferred notes linked to text or written in the margins of a text to the more common drop-down notes. For similar reasons, reviewers favored the rarer programs that provided spaces for answering open-ended questions on-line to the more frequent use of questions asked on-line but designed to be answered off the computer. Features in high school applications that evaluators felt favored a text-based approach included single interpretations of text, the ability to click on text to obtain unitary meanings and information, pop-up definitions, and, to some extent, search capabilities, because these, it was noted, just looked for all instances of a particular word in a given text.

The Role of the Students

"The role of the students" is concerned with whether students are empowered or constrained by a program; in particular, with whether and how a program validates students' responses to a literary work. Evaluators gave this criterion the highest ratings in the response-based category (5.59 overall; 6.09 high school; 5.09 elementary), indicating that they felt that students were somewhat empowered by the multimedia literature programs we reviewed. Applying standards as above to this criterion, evaluators ranked slightly fewer programs (18 overall; 11 elementary, 8 high school) as "poor" roles from a response-based point of view, and a good deal more programs (22 overall; 8 elementary, 14 high school) as "adequate," than on the other response-based considerations. By these standards, however, only 5 applications (3 elementary, 2 high school) were viewed as providing "good" to "excellent" opportunities for students to interact with text from a response-based perspective.

Features that evaluators found empowering included interactive pages, construction tools, note-taking capabilities, nonlinear access to background information, and open-ended questioning, but it was noted that all of these could be improved from a response-based perspective. With regard to the last item, evaluators felt that not only is the agenda of such questions set by the application and not by the student, but the common practice

of presenting questions on-line to be answered off-line tends to value the questions (i.e., the "expert") over the answers (i.e., the student). It should also be noted that the programs we reviewed, if they provided opportunities for response at all, provided opportunities for individual student responses rather than spaces in which discourse among students was encouraged, and none encouraged student-generated questions.

The Role of the Teacher

"The role of the teacher" is concerned with whether a teacher is empowered or constrained by a program, and with whether or not a program promotes student-teacher interaction. Evaluators gave this criterion the lowest ratings in any category (3.68 overall; 4.22 high school; 3.14 elementary), indicating that they felt that teachers were essentially disregarded by the multimedia literature programs we reviewed. If one considers applications with ratings of four or below on this criterion as being "poor," those with ratings of five to seven as being "adequate," and those with ratings of eight or higher as being "good" to "excellent" in terms of teacher empowerment, then fully 29 programs (13 elementary, 16 high school) were seen as poor in this regard. Twelve programs (7 elementary, 5 high school) were viewed as providing "adequate" roles for teachers, and only 4 applications (2 elementary, 2 high school) were seen as providing "good" to "excellent" roles for teachers from a response-based point of view.

Indeed, few of the applications we looked at had well-designed teacher materials, and those that did usually placed them in printed teacher guides, thus undermining their value. Many teacher guides offered no teacher materials at all. Very few of the applications we looked at included any provision for teacher input other than the ubiquitous "notes," and only one included program management tools. In addition, as noted above, none of the applications we reviewed provided public discussion spaces (unless "notes" could be so considered) in which teachers could interact with students in a variety of ways.

CLASSROOM USAGE

The category "classroom usage" is concerned with how a multimedia application might be used to enhance response-based approaches to literature teaching and learning in regular classroom settings. Although it was generally agreed that most of the applications we reviewed were not, in and of themselves, response-based, program evaluators thought that many of them could be used to enhance response-based teaching and learning, especially when used to provoke discourse. These evaluators, some of whom tried some of the programs with small groups of students, felt that three program features generally contributed to their usefulness in these regards:

1. *Good multimedia.* High-quality sound, computer animations, and video were deemed highly motivating and capable of enhancing the literary aspects of a work. Evaluators also thought that good multimedia might prompt comparisons between print and other media, and between students' own and others' interpretations of a work that might lead to deeper understandings. At the same time, evaluators agreed that extrinsic and too extensive use of multimedia might detract from students' literary experiences. They thus thought that a balance between the multimedia and the literary aspects of a program should be striven for.
2. *A high degree of interactivity.* Evaluators thought that programs more responsive to user input were clearly more supportive of a pedagogy grounded in student responses. Features which allowed students to input their own thoughts and reactions to literary works were deemed most useful in this regard, although most evaluators thought interactivity of any sort more engaging than not.
3. *Extensive supplementary materials.* Both on- and off-line supplementary materials were deemed supportive of response-based teaching and learning. On-line support materials containing background information and open-ended questions for discussion were thought particularly useful, as were the activity suggestions found in some teacher guides that encouraged the linking of themes developed in a literary work to students' own experiences.

Evaluators also thought that two implementation-specific factors might make the programs we reviewed more useful in enhancing response-based teaching and learning:

1. *Teacher direction and guidance.* At all levels, evaluators thought that teacher direction and guidance would be necessary for the use of the multimedia applications we reviewed to be used in a response-based manner. It was generally agreed that teachers needed to develop questions, methodologies, tasks, and opportunities for discourse that would lead students to respond to these programs in ways that supported the development of literary understanding.
2. *Student groupings.* The importance of student groupings for program usage is directly related to the notion of discourse opportunities. Evaluators thought for elementary students, the most effective use of would be with whole classes and/or small groups of students. At this level, they believed that a teacher could introduce a book by sharing it with the class and encouraging discussion around it, then direct students to a variety of small-group activities, perhaps including the use of the program. At the high school level, evaluators felt that the most effective use of such programs would be project-oriented activities assigned to small groups.

It is interesting to note that, at all levels, evaluators agreed that in order to foster discourse, the programs we reviewed should be used with at least one other student, preferably in small groups. In contrast, most of those programs seemed clearly

designed for individual use, for dialogue between the machine and the individual or presentation by a teacher to a whole class of students. This is definitely an area where designers should focus more attention. Classroom usage, in turn, is an area where researchers should focus more activity. We need to examine how multimedia can be used in actual literature classes and the effects such usage has on classroom cultures and on students' development of literary understanding.

DISCUSSION

The results of our survey of commercially available multimedia literature applications reveal that while such programs are generally of high technical quality and linked to works commonly taught in schools, the pedagogical approaches taken are not response-based. In general, we found that the approaches to literature teaching and learning taken by the applications we reviewed mirrored the approaches taken in the majority of American schools (Applebee, 1990). Programs designed for elementary students commonly equated literature education with reading instruction; programs designed for high school populations generally adopted a traditional, text-centered approach.

Judith Langer (1990) breaks literary understanding into four stances people take when engaged in the reading process—"Being out and stepping in"; "Being in and moving through"; "Stepping out and rethinking what one knows"; "Stepping back and objectifying the experience." Ideally, multimedia literature applications should support each of these stances. One way to summarize our review of those programs currently available and to suggest how multimedia might be employed to support response-based pedagogies in the future is to examine the features of multimedia, both currently employed and potentially available, with respect to each stance. This is done in the sections which follow.

Being Out and Stepping In

In this stance, readers make initial contacts with the genre, content, structure, and language of the text by using their prior knowledge and its surface features to get sufficient information to begin to build envisionment. With literature, readers try to make initial acquaintance with the characters, plot, and setting, as well as the interrelationships among these. They use information from the text in concert with their background knowledge to get enough information to "step in."

This first stance, then, involves readers being drawn into the text world, and it is where the multimedia literature applications currently available are strongest. They invite access. Interactive graphics, sound, and video not only engage students in ways text alone cannot, but offer alternative, concrete representations of characters, plot,

and setting that bring these in focus for students who might otherwise struggle to envision them. In addition, nonlinear links to background information concerning these and such literary elements as genre, structure, and language increase understanding and accessibility.

Indeed, evaluators who observed students using multimedia were very impressed by the power of multimedia to draw students into a literary work. They report that the use of such features as interactive pages and links to video enactments of text passages encouraged an exploratory approach to literature. Many also found that the use of such programs generated interest in and enthusiasm for the print versions of the works they explored; that students were not only interested in comparing print with multimedia versions of a work as they used the latter, but that they searched out these other works by the same authors on their own time.

Being In and Moving Through

In this stance, readers are immersed in the text world, using both text knowledge and background knowledge to develop meaning. They take new information and immediately use it to go beyond what they already understand, asking questions about motivation, causality, and implications. This stance, then, involves immersion in the text world, hence, it is an arena where a printed text is probably superior to multimedia. Here, multimedia programs might best serve functions similar to reading journals; that is, students might read from a printed text but write comments and questions in a multimedia program as they occur to them. The use of multimedia applications would then have an advantage over written reading journals to the extent that they encouraged the linking of comments and questions to the text, and to the extent that they promoted reflective public discourse around such links. Indeed, current research concerning such experimental environments as "Intermedia" (Landow, 1992) and "Story Space" (Bolter, 1991) suggests features which provide linked commenting capabilities can have a positive effect on literature teaching and learning.

In general, however, the multimedia literature programs currently commercially available are weak on this stance. Many high school applications have a "notes" feature which provides a space where students and or teachers can write comments or questions, but these are not linked to the text and often not even linked to a particular "page" in a document. Elementary school applications do not even provide space for such notes. Another feature that might be considered useful is the open-ended questions integrated into some programs. These prompt off-line student comments and reflections on the text, but both the fact that student answers are completed off-line, and the fact that neither students nor teachers can enter their own questions tends to mitigate their usefulness.

Being In and Stepping Out

In this stance, readers use their text knowledge to reflect on personal knowledge. They use what they read in text to reflect on their own lives, on the lives of others, or on the human condition. Whereas the previous stance was primarily concerned with shared text knowledge and discourse around it, this stance is primarily concerned with private knowledge and personal reflections. Ideally, multimedia literature applications should provide two sorts of spaces—public "discourse" spaces where students can question and comment on the text as well as reflect on others' observations; and private "journal" spaces where they can reflect on their own experiences and understandings without worrying about others' opinions of these. The distinction between public and private spaces in multimedia was not addressed by any of the commercial programs we reviewed. Ideally, multimedia literature applications should also provide means for articulating between such spaces so that students could easily make their private thoughts public or public comments their own. None of the programs we reviewed did so.

The "notes" function common to many high school applications could be seen as either a public space or a private space, but not both. As things stand, it is really neither. It cannot be used as a private space until every student is provided with a personal copy of each program and a personal computer to run it on. As a public space, it has no provision for protecting individual voices. Similarly, open-ended questions designed to be answered off-computer, although not particularly response-based to begin with, could perhaps be used both privately and publicly (when shared in class). As private spaces, however, the computer adds nothing to reading journals and questions given on paper. Questions on paper can at least be referred to while reading. As a public space, the sharing of answers in class cannot encourage ongoing, reflective public discourse the way on-line spaces might. Moreover, neither "notes" nor open-ended questions can be linked to the text or other students' comments.

Stepping Back and Objectifying the Experience

In this stance, readers distance themselves from the text world, reflecting on and reacting to both the content and the experience. They objectify the text, judge it, and relate it to other texts or experiences. This evaluation and generalization is based on their notions of specific genres as well as the content they learned or the literary experiences they engaged in.

This stance is one in which readers relate a text to other texts and other experiences. Here, then, the ideal functions for multimedia to provide would be linking mechanisms similar to those imagined by Vannevar Bush (1945) and described by Ted Nelson (1974, 1987) when he coined the term *hypermedia*—links that readers

could create between what they are reading and other literary texts and other media such as films, links that could be annotated with text and graphics, perhaps even sound and video. Of course, we do not have such capabilities yet, but such experimental environments as "Intermedia" and "Story Space" would indicate they are on the horizon. Other useful tools might be ones for plotting such literary elements as storylines, themes, characters, setting, and imagery. None of the applications we reviewed had such tools.

What the high school applications we classified as databases did have, however, were search, cut-and-paste, and print capabilities that could be used to help students search out and bring together common elements of collected or single works. Such capabilities are promising and could be exploited by a creative teacher to help students "step back and objectify" a literary experience. High school applications classified as hypertext included built-in links dealing with literary elements, and those classified as hypermedia linked text with film interpretations of a work. Such features are also promising and might be expanded in future multimedia literature programs to include student-created links and commentary.

CONCLUSIONS

Our preliminary findings indicate that commercially available multimedia literature applications are at this point technologically, and not pedagogically, driven. That is, most of the applications we have looked at exploit the capabilities of multimedia technologies, often very well, but frequently at the expense of reader-response pedagogies. We have commonly seen single explanations, interpretations, definitions, and pictures popping out of text. We have seen enormous arrays of biographical, historical, and cultural information surrounding texts to the point of overwhelming them. We have seen graphics, animations, sound, video, hypertext, and color used for seemingly no purpose other than that they can be, or used at cross-purposes (i.e., a voice reading something which differs from the text). We have seen very little provision for student input, and almost no provision for collaboration. In short, we have seen applications which support the development of reading skills and "correct" interpretations of literature rather than the development of literary understanding.

We have also seen a lot of promise. We have seen features in many applications that we believe would significantly contribute to students' development of literary understanding if such features were made accessible—the linking capabilities of multimedia and the affective dimensions of video, graphics and design tools, and communications capacities for supporting ongoing conversations among students. Multimedia technology holds promise as a tool for literature teaching and learning. The construction of effective tools for response-based literature teaching and learning

is the focus of the second phase of the Multimedia and Literature Teaching and Learning Project. It will be informed by the strengths and shortcomings of the commercially available multimedia applications we have explored in this first phase of the study.

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